Roll No. | | | | | | | | | | | |

Total No. of Questions: 09 **Total No. of Pages: 02**

B. Tech. (ELECTRONICS) (Sem. 3)
ENGINEERING MATHEMATICS-III
Subject Code: BTAM-301
Paper ID: A1128

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **Section A is COMPULSORY consisting of TEN Questions carrying TWO marks each.**
2. **Section B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **Section C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1.

a) Evaluate $\int \frac{z^2+5}{z-3}$ dz along the circle, |z| = 1

b) Under what condition or conditions the general linear partial differential equation of second order is hyperbolic.

c) Define the term "an indicial equation".

d) Find, L [(e^{3t} sin2t)/t].

e) Form a partial differential equation from z = $f(x + y + z, x^2 + y^2 + z^2)$.

f) Expand sin z in Taylor's series about the point z = 0.

g) Find the sum of the residues at each pole of the function *f(z)*, lying inside the circle |z| = 2 where *f(z)* is given by,

$$f(z) = \frac{\sin z}{z \cos z}$$

h) If it is required to find the Fourier series of an odd function in $(-\pi, \pi)$ then which formulae you will use?

i) What are Dirichlet's conditions for the expansion of *f(x)* as a Fourier series in $(-\pi, \pi)$

j) State and prove the first shifting property of Laplace transforms

SECTION B

2. Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x\, \partial y} = \cos x \cos 2y$

3. State and prove the Cauchy's integral formula.

4. Using Laplace transforms, solve the differential equation,

$\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + 5x = e^{-t}$ sin t where x(0) = 0, x' (0) = 1

5. Find the Fourier series to represent, $f(x) = x^2 - 2$, where $-2 \leq x \leq 2$

6. Find the inverse Laplace transform of the function, $\log\left(\frac{s+1}{s}\right)$

SECTION C

7. Use the concept of residues to evaluate, $\int_0^{\pi} \frac{dx}{a+b\cos x}$, where $a \geq |b|$
8. A string of length L is stretched and fastened to two fixed points. Find the solution of the one dimensional wave equation when initial displacement,

   $y(x, 0) = f(x) = k(Lx - x^2)$.
9. Solve in series, $(1 + x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = 0$